tion data in an IPv6 packet. The Destination Options header typically includes options that need to be examined by the first destination that appears in the IPv6 Destination Address field plus subsequent destinations listed in the Routing header.

[0055] FIG. 4B illustrates the format of the options field of a Destination Options header. The Destination Options header carries a variable number of type-length-value (TLV) encoded "options." The option type code **462** will need to be assigned by IANA, e.g., the "GEO" code could be assigned to represent that the Destination Options header contains geo-location information. As stated above, "GEO" is only one example of a code that may be assigned by the IANA to indicate the inclusion of geo-location information in a packet. The option-data field **464** may indicate the length of the GEO location information.

[0056] FIG. **5** illustrates an exemplary format for an IPv6 extension header data with geo-location information in accordance with an embodiment of the present invention. For example, in one embodiment, the header data can contain a 3 byte data prefix field **502** indicating the type of data transmitted in the data field, e.g., "GEO."

[0057] In one embodiment, the extension header can comprise a 7 byte data field for latitude and accuracy training. For example, a 2 byte field **504** can be allocated to latitudinal degrees, a 2 byte field **506** can be allocated to latitudinal minutes and a 2 byte field **508** can be allocated to latitudinal seconds. Further, a 1 byte field **510** can be allocated to accuracy and direction. In one embodiment, bit **0** of the 1 byte field **510** when set can indicate "North" whereas when un-set can indicate "South." Bits **1** to **7** of the 1 byte field **510** can, in one embodiment, for example, indicate latitudinal accuracy in increments of 10 meters, e.g., when set to 3, latitudinal accuracy would be 30 meters. Also, a zero value for bits **1** to **7** could indicate a configured or artificial value.

[0058] Similar to latitude related fields, the extension header can also comprise a 7 byte field for longitude and accuracy training For example, a 2 byte field **512** can be allocated to longitudinal degrees, a 2 byte field **514** can be allocated to longitudinal minutes and a 2 byte field **516** can be allocated to accuracy and direction. Further, a 1 byte field **518** can be allocated to accuracy and direction. In one embodiment, bit **0** of 1 byte field **518** when set can indicate "West" whereas when un-set can indicate "East." Bits **1** to **7** of the 1 byte field **518** can, in one embodiment, indicate longitudinal accuracy in increments of 10 meters, for example. It should be noted that FIG. **5** only provides one example of the format and type of data that can be used to convey geo-location information. Many other embodiments are possible as well.

[0059] FIG. **6** illustrates an exemplary configuration of a network using extension headers in IPv6 packets to transmit geo-location information in accordance with an embodiment of the invention. When the client **605**, e.g., a personal computer, a smart phone, a tablet computer, a thin client etc. transmits a request, an IPv6 extension header, in one embodiment, is inserted into the IPv6 packet by the client device **605**. Alternatively, another gateway device, e.g., switch **655** through which the client's traffic passes can also be configured to insert the geo-location extension header into the IPv6 packet. In one embodiment, either device **605** or **655** can dynamically update positional data in real-time through Global Positioning System (GPS), cellular or other location-based source. For example, the client **605** could be configured to retrieve data from the built-in GPS on a smart phone device to insert into the extension header. Alternatively, the client may be configured to obtain the location data from a cellular source. In one embodiment, instead of updating dynamically, the positional data can be configured manually.

[0060] In one embodiment, the present invention provides a method for authenticating packets that originate from a client device based on geographic location of the client. For example, a device, e.g., router **656** in the path of the traffic could examine the geo-location information in the extension header and provide protection or service changes and monitoring based on the location data before the traffic reaches its intended destination device A **630** or destination device B **635**.

[0061] If providing protection, the in-path device **656** can, in one embodiment, have a database of geographic boundaries for countries and several depths of sub-regions within them. Using this data, in one embodiment, device **656** could tie the packet to a given country and sub-region and block traffic, rate limit, or provide additional filtering services if configured. This feature could be used, for example, in DDOS applications wherein DDOS attacks could be prevented by blocking traffic from certain problematic geographic regions. Or, for example, traffic from certain problematic regions could be more carefully examined before allowing it to pass through.

[0062] In one use case, for example, the geo-location information sent from a client's device can also be used to block undesirable traffic, e.g., text messages sent by the driver of a car in motion This location information can be inserted directly into the IPv6 packets by the client device, e.g., a smart phone being used by the driver. Alternatively, a beacon within the vicinity, e.g., a Wi-Fi device in the car could be configured to determine the location of devices requesting access to the network and insert the location data to the outgoing packets. For example, based on signal strength the beacon could determine relative locations of the devices and determine if the traffic was coming from the driver of the car versus the passengers. Then based on the location inserted into outgoing text message header, an in-path device, e.g. a load balancer could accept or reject the incoming traffic from the device.

[0063] In one embodiment, the present invention provides a method for prioritizing data packets from a certain location over other types of data packets. For example, data packets originating from a corporate source could receive higher priority over others. Or, for example, traffic for one department within the company, e.g. engineering could be prioritized over traffic from a different group within the company, e.g., human resources.

[0064] By way of further example, if the location of a client indicates that the user is on stage, e.g., during a concert or presentation, versus a member of the audience, the traffic to the on-stage user could be prioritized versus the rest of the audience. Similar to the car use case explained above, the location information can be inserted directly into the IPv6 packets by the client device, e.g., a smart phone itself Alternatively, a beacon within the vicinity, e.g., a Wi-Fi router could be configured to determine the location of devices requesting access to the network and insert the location data accordingly into the outgoing packets. The beacon could determine relative locations, for example, by using signal strength.

[0065] If providing service changes, in one embodiment, the in-path device **656** could have the same database of geographic boundaries, as described above, but could use them